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EXAMINER

RODRIGUEZ, PAUL L

ART UNIT

PAPER NUMBER

2125

DATE MAILED: 10/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/784,971

Applicant(s)

LIM, SOO-HYUN

Examiner

Paul L. Rodriguez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/17/04</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

1. Claims 1-14 are presented for examination.

Drawings

2. The drawings are objected to for the following:

Figure 3A, step S90 to turn on the igniter, displays the formula $T_s > T_r - T_1$. Using the variables defined in the specification, the igniter would only turn on when the real time temperature more than 2 degrees above the set temperature, which is opposite of what is described in the specification. If $T_s = 25$, according to the formula, in order to turn on the igniter T_r has to be greater than 27, below that the program simply loops back to S70 and never turns on.

Figure 3B step S190 to turn off the igniter, again given a $T_s=25$ and $T_2=1$, the igniter should be turned off when heat is no longer required, when the T_r is at 26+. Given the formula in S190 and with the igniter on, the igniter will never turn off if T_r is greater than or equal to 24.

Figure 4, boxes S144 and S147 use the word "POSER" and "LEDI" instead of "POWER" and "LED1".

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the

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drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 63, S20 and S89. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The examiner has provided a number of examples of the drawing deficiencies in the above, however, the list of deficiencies may not be all inclusive. Applicant should refer to these as examples of deficiencies and should make all the necessary corrections to eliminate the drawing objections.

Specification

5. The disclosure is objected to because of the following informalities:

Page 6 lines 18-19 refer to “a power fuse 13”, reference number 13 previously power switch.

Page 12 line 3 states “...LED2 for turned on/off in accordance with...” language is awkward and broken, possibly due to a literal translation from a foreign language, would be better as “...LED2, turned on/off in accordance with...”

Page 12 lines 22-23 recite “microcomputer .130” appears to have an inadvertent period.

Page 14 line 21 states “value ofa the”.

Page 17 paragraph 76 and page 11 paragraph 40. The specification describes how reference number 90 is used to sense Tb of the burner, while at the same time reference number 90 is also described as the thermistor RTH used to sense the indoor temperature Tr. Examiner is unclear how the temperature sensing unit, with one thermistor could possibly sense both Tb and Tr.

Page 22 line 1 stats “clears the time counter again (S88 to S149), probably should be (S88 to S89).

Appropriate correction is required.

6. The examiner has provided a number of examples of the specification deficiencies in the above, however, the list of deficiencies may not be all inclusive. Applicant should refer to these as examples of deficiencies and should make all the necessary corrections to eliminate the specification objections.

Claim Objections

7. Claims 1 and 10 are objected to because of the following informalities:

Claim 1 line 6 states “then indoor temperature inputted in real time”, would be better as “an indoor temperature inputted in real time”. Previously the claim recites “an indoor temperature” however it appears that the above term is directed to a separate and distinct claim element.

Claim 1 lines 6-7 refer to “the digital set temperature”, previously “converting a user’s set temperature value into a digital signal”, which are considered separate and distinct limitations then a digital set temperature, could create an antecedent problem or confusion in the claim language.

Claim 1 lines 7-8 refers to “the set temperature”, previously “a temperature set by a user in a digital signal” and “digital set temperature” but never referred to as “a set temperature”, could create an antecedent problem or confusion in the claim language.

Claim 1 line 9 recites “...temperature is high then the...”, language is awkward and broken, possibly the result of a direct translation, would be better as “...temperature is higher then...”

Claim 10 line 5 refers to “the digital set temperature”, previously “a temperature set by a user into a digital signal”, but not a digital set temperature, could create an antecedent problem or confusion in the claim language.

Claim 10 line 10 refers to “the set temperature”, previously “a temperature set by a user in a digital signal” and “digital set temperature” but never referred to as “a set temperature”, could create an antecedent problem or confusion in the claim language.

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Claim 10 line 13 recites “the indoor temperature rising according to”, would be better as “...rise, according to...” Language is awkward and broken, possibly the result of a direct translation.

Claim 10 line 14 refers to “driving of the burner is high then...” would be better as “...higher then...” Language is awkward and broken, possibly the result of a direct translation.

Claim 10 lines 16-21 fails to further limit the claim. Lines 16-19 recite the same limitations presented in lines 8-10 and lines 19-21 recite the same limitation in lines 13-15.

Appropriate correction is required.

8. The examiner has provided a number of examples of the claim deficiencies in the above, however, the list of deficiencies may not be all inclusive. Applicant should refer to these as examples of deficiencies and should make all the necessary corrections to eliminate the claim objections.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 3 and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 3 recites the limitation "temperature display" in line 3. There is insufficient

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antecedent basis for this limitation in the claim. Previously “a display unit”, “a temperature display unit” and “temperature display selection unit”, unclear which is being referred to.

11. Claim 14 recites the limitation "the igniter" in line 3. There is insufficient antecedent basis for this limitation in the claim.

12. Due to the number of claim deficiencies, the claims have been treated on their merits as best understood by the examiner.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 1, 4, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al (U.S. Pat 5,224,649) in view of Rhodes et al (U.S. Pat 6,164,374).

Brown et al teaches (claim 1) a temperature control apparatus for a heater (figure 4) using an encoder switch (reference number 42, col. 3 line 59 – col. 4 line 3) that controls an indoor temperature (col. 3 lines 11-21) by driving a burner (col. 3 lines 15-18) in accordance with a change of an indoor temperature and ventilating heated air indoors (col. 3 lines 11-29, col. 5 lines 19-64) the apparatus comprising: an encoder switch converting a user's set temperature value into a digital signal of a predetermined number of bits (reference number 42, col. 4 lines

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46-65), a microcomputer (reference number M1) for comparing the indoor temperature inputted in real time with the digital set temperature (figure 5, reference number 112), driving the burner if the indoor temperature is lower than the set temperature by less than a predetermined temperature T_1 , and stopping the driving of the burner if the indoor temperature is high than the set temperature by more than a predetermined temperature T_2 (col. 5 lines 19-64), and a display unit (reference number 400), (claim 10) a temperature control method (col. 2 lines 1-44) for a heater (reference number 14) using an encoder switch (reference number 42) that controls an indoor temperature by driving a burner in accordance with a change of an indoor temperature and ventilating heated air indoors (col. 3 lines 11-21), the method comprising the steps of converting a temperature set by a user into a digital signal of a predetermined number of bits through the encoder switch and inputting the digital set temperature (col. 3 line 59 – col. 4 line 65), sensing the indoor temperature changed in real time (reference number 38) through a thermistor and inputting the sensed indoor temperature (col. 3 lines 52-58), comparing the indoor temperature inputted in real time with the digital set temperature inputted from the encoder switch, and driving the burner if the indoor temperature is lower than the set temperature by less than a predetermined temperature T_1 (col. 5 lines 19-33, 52-64), stopping the driving of the burner if the indoor temperature rising according to the driving of the burner is high than the set temperature by more than a predetermined temperature T_2 (col. 5 lines 19-33, 52-64), and maintaining the indoor temperature uniformly with the set temperature by sensing the indoor temperature dropping according to the stop of the driving of the burner, driving the burner if the indoor temperature is lower than the set temperature by less than a predetermined temperature T_1 , and stopping the driving of the burner if the indoor temperature rising according to the driving of the burner is high than the set temperature by more than a predetermined temperature

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T₂ (inherent to every thermostat controller, col. 5 lines 19-64).

A fails to teach (claim 1) a display unit for checking and displaying various kinds of error modes occurring while the burner is driven in accordance with a control signal inputted from the microcomputer, (claim 10) checking and displaying various kinds of error modes occurring while the burner is driven, (claim 4) wherein the display unit comprises an ignition state display unit for displaying an ignition state of the burner through a power LED in accordance with the control signal from the microcomputer; wherein the microcomputer checks the various kinds of error modes occurring while the burner is driven, and if an error occurs, the microcomputer displays the error mode by flickering the power LED at predetermined intervals (claim 8) comprising a thermistor for sensing the indoor temperature changed in real time, wherein the microcomputer checks an error mode occurring due to disconnection of the thermistor by checking a voltage value inputted from the thermistor.

Rhodes et al teaches (claim 1, 10) a temperature control apparatus (figure 4) for a heater (reference number 34, col. 1 lines 15-18, col. 2 lines 49-61) using an encoder switch (reference number 24, 26) that controls an indoor temperature (col. 2 lines 40-48) by driving a burner (furnace col. 4 lines 61-65), in accordance with a change of an indoor temperature and ventilating heated air indoors (reference number 52), the apparatus comprising an encoder switch converting a user's set temperature value into a digital signal of a predetermined number of bits (reference number 24 and 26 considered encoder switches), a microcomputer (reference number M1) for comparing the indoor temperature inputted in real time with the digital set temperature, driving the burner if the indoor temperature is lower than the set temperature by less than a predetermined temperature T₁, and stopping the driving of the burner if the indoor temperature is high than the set temperature by more than a predetermined temperature T₂ (col. 3 lines 3-21,

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considered inherent to all thermostat controllers) and a display unit for checking and displaying various kinds of error modes occurring while the burner is driven in accordance with a control signal inputted from the microcomputer (col. 4 lines 28-35, col. 5 lines 8-15), (claim 4) wherein the display unit comprises an ignition state display unit for displaying an ignition state of the burner through a power LED in accordance with the control signal from the microcomputer (col. 3 lines 44-61, col. 5 lines 2-15, while the example is set for a heat pump, the system is also for a furnace, it would be obvious to use the LED indicator to show the state of the burner), wherein the microcomputer checks the various kinds of error modes occurring while the burner is driven, and if an error occurs, the microcomputer displays the error mode by flickering the power LED at predetermined intervals (col. 4 lines 28-34), (claim 8) comprising a thermistor for sensing the indoor temperature changed in real time (col. 3 lines 17-25), wherein the microcomputer checks an error mode occurring due to disconnection of the thermistor by checking a voltage value inputted from the thermistor (col. 4 lines 28-35, col. 5 lines 8-15).

Brown et al and Rhodes et al are analogous art because they are both related to temperature control for a heater.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the display unit of Rhodes et al in the Thermostat of Brown et al because Rhodes et al teaches an improved thermostat controller for a furnace or other heater, and/or an air conditioner and/or a heat pump, the cover of the thermostat has just a single opening for accommodating a single bi-color LED 86. This same cover can be used on a wide variety of thermostats with the capability of providing one, two, three, or perhaps more light signals of different colors. Through the use of a bi-color LED, the user sees a single indicator and is not confused by "extra" indicators that do not apply to the user's system. The same basic

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thermostat can be used in climate control systems requiring one or more indicator lamps, reducing manufacturing and inventory costs (col. 4 lines 61 – col. 5 line 7).

14. Claims 2, 3, 5-7, 9 and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al as modified by Rhodes et al as applied to claims 1 and 10 above, and further in view of Nelson et al (U.S. Pat 5,350,114).

Brown et al as modified by Rhodes et al teaches a temperature control apparatus as recited in claims 1 and 10 for the reasons above, differing from the invention as recited in claims 2, 3, 5-7, 9 and 11-14 in that their combined teaching lacks (claim 2, 5) the microcomputer checks the various kinds of error modes occurring while the burner is driven, and if an error occurs, the microcomputer displays the error mode by characters through the temperature display unit, (Claim 3) a temperature display selection unit for selectively displaying the indoor temperature displayed through the temperature display by Celsius (C) or Fahrenheit (F), (claim 6) a fire sensing unit for sensing an ignition state of the burner by sensing a fire sensitivity in the burner, wherein the microcomputer checks error modes occurring due to a failure of an initial ignition of the burner and an incomplete combustion of the burner by checking a voltage value inputted from the fire sensing unit, (claim 7) wherein the microcomputer determines the incomplete combustion if a value of 100 ms is inputted three times or more for a predetermined time, and the predetermined time is 5 seconds, (claim 9) further comprising a temperature sensing unit for sensing a temperature of the burner that rises according to a combustion operation of the burner, wherein the microcomputer checks an error mode occurring due to overheat of the burner by checking a voltage value inputted from the temperature sensing unit and (claim 11-14) displaying specific error codes for specific errors.

Nelson et al teaches (claim 2, 5) the microcomputer checks the various kinds of error modes occurring while the burner is driven, and if an error occurs, the microcomputer displays the error mode by characters through the temperature display unit (col. 6 line 26 – col. 11 line 34, discuss the various trouble codes that are used and displayed by the temperature control apparatus), (Claim 3) a temperature display selection unit for selectively displaying the indoor temperature displayed through the temperature display by Celsius (C) or Fahrenheit (F) (col. 5 lines 4-5, reference number 348), (claim 6) a fire sensing unit for sensing an ignition state of the burner by sensing a fire sensitivity in the burner (reference number 216), wherein the microcomputer checks error modes occurring due to a failure of an initial ignition of the burner and an incomplete combustion of the burner by checking a voltage value inputted from the fire sensing unit (trouble code 003), (claim 7) wherein the microcomputer determines the incomplete combustion if a value of 100 ms is inputted three times or more for a predetermined time, and the predetermined time is 5 seconds (col. 10 lines 7-16, while specific numbers are not recited, the system does determine incomplete combustion and the values would be an obvious variation of sensing to avoid false readings), (claim 9) further comprising a temperature sensing unit for sensing a temperature of the burner that rises according to a combustion operation of the burner (reference number 218), wherein the microcomputer checks an error mode occurring due to overheat of the burner by checking a voltage value inputted from the temperature sensing unit (col. 9 line 62 – col. 10 line 6) and (claim 11-14) displaying specific error codes for specific errors (Nelson et al clearly discloses various errors can be sensed and specific error codes can be produced on the temperature display 210 for those errors and it would be obvious to include any types of errors, using any types of error codes to display those errors to a user of the system).

Brown et al as modified by Rhodes et al and Nelson et al are analogous art because they

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are both related to temperature control for a heater.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the error codes of Nelson et al in the Temperature control apparatus of Brown et al as modified by Rhodes et al because Nelson et al teaches that the use of trouble codes and stored trouble codes displayed to a owner or service technician improves the ability to trouble shoot the controller when a failure occurs (col. 11 lines 22-34).

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Rayburn et al (U.S. Pat 6,250,382) – teaches a heater controller where the user sets the upper and lower set point variations.

Bunting (U.S. Pat 5,612,904) - teaches a system for determining specific faults with a burner and igniter and displays those faults to a user.

Hoglund et al (U.S. Pat 5,438,844) – teaches a thermostat with displays and indicators and a system that provides fault indications and fault codes.

Marran et al (U.S. Pat 5,424,554) – teaches a system for determining specific faults with a burner and igniter and displays those faults to a user.

Mehta (U.S. Pat 5,038,851) – teaches the on and off temperature ranges for controlling a heater.

Briccetti et al (U.S. Pat 4,483,388) – teaches a temperature control apparatus where the thermostat checks to make sure inputs from the thermostat are in a legal pattern and utilizes a lamp, which blinks a thermostat lamp to indicate various fault modes. Also detects specifically

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faults in the wiring of the thermostat.

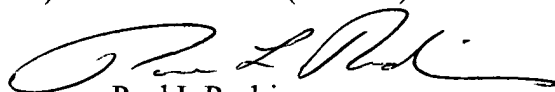
Neel (U.S. Pat 4,235,368) - teaches a thermostat assembly that displays error codes.

Pinckaers (U.S. Pat 4,181,957) - teaches a digital display system for controlling a heater that controls a heater, uses an encoder to enter the set temperature, has a microcomputer for comparing and controlling the temperature and includes a display unit that can display temperature in either Fahrenheit or Celsius.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul L. Rodriguez whose telephone number is (571) 272-3753. The examiner can normally be reached on 6:00 - 4:30 T-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard can be reached on (571) 272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Paul L Rodriguez
Primary Examiner
Art Unit 2125

PLR
10/26/05